by the Academy of Sciences to admit him as Member of that body. The Russian Chemical and Physical Society, while electing him Honorary Member, has presented him with an address in which it is stated that the Society considers him "to be a chemist who has no equal among Russian chemists." Many scientific bodies, as the University of Kieff, the Society of Hygiene, &c., have elected him Honorary Member or President. A public subscription has been opened for the institution of a prize bearing his name, and a great dinner was given in his honour by the St. Petersburg *savants*, among whom we notice the most eminent Russian Members of the Academy of Sciences. It is worthy of notice that Professors Korkin and Setchenoff, as well as the late M. Hilferding, the Panslavist explorer of Slavonian literature, met at the hands of the Academy of Sciences the same fate as M. Mendeleeff.

THE law for the isolation of the French National Library has been adopted by both Houses of the French Parliament, and the necessary expropriation for the great work will begin immediately.

AT a recent sitting the Municipal Council of Paris voted a sum of 400*l.* for the establishment of a School of Chemistry. It will be opened free to the pupils of the several Municipal schools who are desirous of practice in chemical industries.

THE French Government is to establish in Egypt a school of Egyptology, which will be directed by M. Maspero, now Professor of Egyptology to the College of France. This creation will be the third school established abroad at the expense of the French Budget. The two others are one at Rome and the other at Athens.

THE Thirteenth Annual Report of the Eastbourne Natural History Society testifies to the Society's continued prosperity. At the meeting of November 19 Dr. Royston Pigott read an interesting paper on "The Limits of Human Vision."

THE *Proceedings* of the Belfast Natural History and Philosophical Society for 1878–80 contains, besides several general papers, a few natural history papers of local interest, including one (with illustrations) on Irish Spiders, by Mr. Thomas Workman.

A BALNEOLOGICAL and a patent-protection exhibition wll be held at Frankfort-on-the-Main in 1881.

OUR ASTRONOMICAL COLUMN

VARIABLE STARS.—Amongst the stars which, from a comparison of the various catalogues, exhibit more or less strongly signs of variability, may be mentioned the following, which we take in order of right ascension; the positions are for the year 1880:—

1. Lalande 2037-8. R.A. 1h. 3m. 24s., N.P.D. 38° 30′·5. On September 29, 1790, Lalande rated this star 10m., and on December 27 following, 8·9; the B.D. (by which letters we refer to the Bonn *Durchmusterung*) has 7·0. Harding marks it a ninth.

2. 40 Cassiopeæ. R.A. 1h. 28m. 57s., N.P.n
Lalande calls this star 4m. in September, 1789, and 6 i
1790. In Argelander's zone No. 167 on January 1 , 1843, i was estimated 7, yet in the B.D. it is 5·2. In the first Radcliffe catalogue, where great attention was given to the magnitudes, it is 4·7; Piazzi has 6, Groombridge 5·6, and Heis the same.

3. Lalande 4864-5. R.A. 2h. 32m. 15s., N.P.D. 40° 57′·4. Estimated 9 in September, 1790, and 7½ in January following; but it has since been discerned with the naked eye, Heis calling it 6·7. The B.D. has 6·7. It is not in Houzeau.

4. Bradley 396. R.A. 2h. 53m. 13s., N.P.D. 8° 59′·8. Lalande rated this star 4·5 in November, 1789, and 7 in March, 1790. Groombridge, who made six observations for position, estimated it 7, Heis and Carrington 6, while it is 5·5 in the B.D.

5. 35 Camelopardi. We have already referred to the marked discordances in the estimates of the magnitude of this star in the various catalogues. Dembowski has directed attention to the probable variability of the principal component, and the star certainly deserves more regular attention at the hands of observers than it has yet received. R.A. 5h. 54m. 58s., N.P.D. 38° 25′·5. The estimated magnitudes vary from 5·5 to 8.

6. Attention may be once more directed to the star which Rümker compared with Encke's comet at Paramatta, N.S.W., on June 19, 1822, and which he rated at the time 4·5. Whether it really attains this degree of brightness is not yet certain; it is however 6·0 in the *Uranometria Argentina*, and was observed as low as 8m. in 1873. The B.D. says 6·5. Its light is a full yellow. R.A. 7h. 23m. 15s., N.P.D. 91° 39′·5.

7. 65 b^2 Geminorum. R.A. 7h. 22m. 21s., N.P.D. 61° 50′·3. Lalande rated this star as low as 8½ in March, 1794, but calls it 5½ in February following. Bessel estimated it 7; all other observers say 5 or 5·6.

8. 16 Leonis Minoris. R.A. 9h. 42m. 51s., N.P.D. 49° 48′·7. D'Agelet has 5 and 7·8, Lalande 6½, Piazzi 8, the first Radcliffe Catalogue 6·6, Bessel, Taylor, and the B.D. 7, Houzeau 5·6, but neither Argelander nor Heis included it amongst the stars visible to the naked eye.

9. Lalande 19034. R.A. 9h. 34m. 49s., N.P.D. 113° 2′·7. It appears strange that a star isolated as this is should not have been more frequently observed on the meridian, if always as bright as say 5m. D'Agelet and Piazzi have not got it; Lalande calls it 4½ on March 21, 1797; Argelander has 6 on March 6, 1850, 4 on February 16, 1851, and 5 on March 8, 1852; Heis and Houzeau call it 5, and Gould 5·2.

If we may rely upon the observations of Kirch early in the last century there would appear to be sensible changes in the relative brightness of β and δ Scorpii; on January 17, 1704, he writes: "β und δ erschienen fast im gleicher Grosse, jedoch δ ein wenig heller (jetzt ist β 2, δ 3 grösse)," while on April 1 following he records "δ merklich grösser als β." Argelander and Heis estimate β and δ respectively 2 and 2·3; Gould has no sensible difference.

10. Lalande 38405. R.A. 20h. 0m. 16s., N.P.D. 94° 45′·4. This star was rated 6 on July 15, 1794, 7 on August 15, 8 on August 20, and 7½ on August 30 of the following year. It is 8 in Bessel, 7 in Wolfer's map, one of the series of the Berlin Academy, and 6·7 in Heis and Houzeau. Gould does not give it. It might be inferred from Lalande's observations that the period is not very long.

11. 33 Capricorni. Chacornac says of this star: "Observée tantot plus brillante, tantot moins qu'une étoile de 7me grandeur dont elle est voisine:" the seventh magnitude alluded to being, it may be presumed, O.A. 21386, which follows 2m. 12s., 9′·4 to the south. 33 Capricorni is 5·6 in Argelander, 6·5 in Heis and Behrmann, and 5·7 in Gould; it is one of Chacornac's red stars, Gould also calls it red. The evidence of variability in this case seems to rest with Chacornac. R.A. 21h. 17m. 21s., N.P.D. 111° 21′·5.

12. 17 ι Andromedæ, a star previously noted in this column as variable. In the "British Catalogue" it is rated 4; Bradley and Piazzi call it 7; Lalande's three estimates are 5, 5 and 4; D'Agelet has 3·4 and 6; the first Radcliffe catalogue 3·9, and the B.D. 4·2; estimates from 4 to 7 are therefore sufficiently confirmed: the variation may be slow, but the star certainly deserves attention. R.A. 23h. 32m. 15s., N.P.D. 47° 24′·1.

THE COMET 1873 VII.—The comet discovered by Coggia at Marseilles on November 10 and by Winnecke on November 11 was soon lost in Europe from its rapid southerly motion; indeed the observations extend over less than a week. The elements exhibited a similarity to those which had been assigned to a comet detected by Pons in February, 1818, but very imperfectly observed, and Prof. Weiss, the present director of the Imperial Observatory at Vienna, was at the trouble of examining the question of possible identity as closely as the data permitted. He formed three normal positions from the small number of observations—for November 11, 13, and 15—and under the condition that the first and third normals should be exactly represented he ascertained how the second one was represented on the assumption (1) that the orbit was parabolic; (2) that the period of revolution corresponded to the interval between the perihelion-passages in 1818 and 1873, or 55·82 years; and (3) that the comet had completed eight revolutions in this interval, or that the period extends only to 6·977 years. As a matter of figures the agreement was found to be slightly closer for hypothesis (3) than for the other two, the parabola showing the largest differ-

© 1880 Nature Publishing Group

ence. Hence so far as the paucity of data in 1873 enabled any judgment to be formed, the preference appeared to belong to the revolution in 6·977 years. On this supposition there would be a very near approach to the orbit of Jupiter near the ascending node, which would render possible an amount of perturbation at some past time, that might have fixed the comet in an orbit of such limited dimensions.

If the comet were really revolving in an elliptical orbit with this period of revolution, neglecting perturbations, which might however be sensible since 1873, it would be again due at perihelion about November 24 in the present year, in which case its track in the heavens would not be very different from that followed in 1873. We are not aware if any search has been made for the comet. It would have been possible to have decided in 1873 if a short period were admissible could observations have been obtained in the southern hemisphere: this was not done, and the identity of the comets of 1818 and 1873 remains therefore open to conjecture; but it must be borne in mind that the data in the former year are in a high degree uncertain.

PECHÜLE'S COMET.—Elements computed by the discoverer from observations at Copenhagen on December 16, 17, and 20, have a general resemblance to those of the comet of 1807, so elaborately discussed by Bessel, but after his resulting period of many centuries, and considering the position of the orbit in the system, there can be of course no question of identity of these bodies. At Greenwich noon on January 1 the comet's position will be, by Pechüle's elements, in R.A. 20h. 1·9m., N.P.D. 70° 24′, and on January 5 in R.A. 20h. 19·6m., N.P.D. 68° 30′.

CHEMICAL NOTES

MM. HAUTEFEUILLE AND CHAPPUIS, in continuing their investigation of the conditions under which oxygen is transformed into ozone, have shown in *Compt. rend.* that the character of the electric discharge to which the oxygen is subjected largely influences the quantity of ozone produced. If the discharge assume the character of a luminous shower the maximum amount of ozone is produced, the temperature of such a discharge being lower than that of the ordinary *effluve*. The production of this special form of discharge is ensured by mixing with the oxygen a small quantity of a foreign gas whose physical properties are dissimilar from those of oxygen; of the gases experimented with silicon fluoride has given the best results. If nitrogen be the foreign gas the transformation into ozone is greater than when pure oxygen is employed, but the discharge is not altogether luminous. Hydrogen is more effective than nitrogen. The presence of carbon dioxide also insures a large amount of ozonation. In their earlier experiments on the liquefaction of ozone the authors only succeeded in obtaining a mist in the Cailletet tube when the pressure was suddenly withdrawn. They now find that if a mixture of carbon dioxide and oxygen which has been ozonised at a low temperature be submitted to the action of the silent discharge at − 23°, and be slightly compressed, the gas acquires a deep blue colour, and after a time a blue liquid is produced. At − 88° the liquid is very dark blue. When carbon dioxide is decomposed by the electric spark at − 23° a blue gas is produced, and at a certain pressure (exact pressure is not mentioned) the undecomposed carbon dioxide condenses to a blue coloured liquid. By this experiment the authors think they have proved that ozone is one of the products of the decomposition, by the spark, of carbon dioxide.

THE heat of formation of benzene has recently been measured by Thomsen (*Berliner Berichte*) and by Berthelot (*Compt. rend.*). The results show considerable differences: but from the accounts of the experiments, Thomsen's number seems the more trustworthy. For the heat of combustion of gaseous benzene Thomsen finds the number 805,800 heat units; Berthelot the number 776,000. For the heat of formation of gaseous benzene, at constant volume, from amorphous carbon and hydrogen, Thomsen finds − 20,120 heat units; Berthelot, on the other hand, finds + 5800. Berthelot does not state whether this number is calculated for constant volume or constant pressure. Thomsen makes certain theoretical deductions from the value which he has found for the heat of formation of benzene, basing these on his calculations for the heat of formation of "singly- and doubly-linked" carbon atoms (see NATURE, vol. xxii. p. 608): he concludes that the generally accepted hexagon formula for benzene is probably incorrect, and that a formula in which each carbon atom is "singly linked" to three others is to be preferred.

BERTHELOT finds the heat of formation of gaseous dipropargyl—C_6H_6—a metamer of benzene—from amorphous carbon to be − 64,800 heat units. The instability and easy polymerisation of this body are explained by the great absorption of heat which occurs in its formation. Attempts to transform dipropargyl into benzene were unsuccessful. Berthelot has also determined the heats of formation of various hydrocarbons, and finds certain constant differences between the successive members of homologous series.

HERR V. MEYER describes in the *Berliner Berichte* a very elegant modification of his method of determining vapour densities, whereby the specific gravities of permanent gases may be readily measured at very high temperatures. At the highest temperature of a Schlösing's furnace (about 1400°) the density of hydrogen vapour was normal. It has now been shown that the coefficients of expansion of the following gases are not changed at very high temperatures: tellurium, sulphur, nitrogen, oxygen, hydrogen, mercury, carbon dioxide, hydrochloric acid, arsenious oxide.

THE following numbers for the vapour densities of tellurium and selenium have been recently obtained by Deville and Troost (*Compt. rend.*):—Selenium at 1420° = 5·68 (calculated = 5·54), tellurium at 1440° = 9·0, at 1390° = 9·08 (calculated = 8·93).

IN the *Wien. Acad. Berichte* Herr Offer describes the results of experiments which he thinks show that Guthrie's cryohydrates are merely mixtures of various salts and ice: alcohol dissolves the ice, leaving a "skeleton" of undissolved salt; cold water dissolves the salt, and leaves the ice with the form of the cryohydrate. Solution of a cryohydrate is attended with the same thermal change as solution of the salt and ice separately.

THE connection which exists between the opium and cinchona alkaloïds, and between both of these groups of compounds and pyridine, has been recently made more apparent by the work of Herr E. v. Gerichten (*Berliner Berichte*), who has shown that the so-called apophyllenic acid—obtained by oxidising the opium alkaloïd cotarnine—is really the acid methyl salt of pyridine dicarboxylic acid, which acid is obtained from the cinchona alkaloïd cinchonine, and which when heated with lime yields pyridine.

WHEN an aqueous solution of potassium, sodium, or lithium chloride, or potassium nitrate is kept for some time in a vertical tube, the upper part of which is maintained at a considerably higher temperature than the lower part, diffusion of the salt from the hotter to the colder part occurs, according to M. C. Soret (*Naturforscher*) The amount of diffusion in a given time depends upon the original concentration of the solution, and is also connected with the molecular weight of the salt used.

M. DUFET stated some little time since that the refractive index of a mixture of isomorphous salts in solution is equal to the mean of the indices of the components. Herr Fock (in *Zeitschrift für Crystallographie*) concludes, from measurements of the refractive indices of solutions of thallium and potassium alums, of lead and strontium thiosulphate, and of magnesium chromate and sulphate, that Dufet's statement does not hold good in all cases: for the second pair of salts mentioned above it is approximately correct. In *Compt. rend.* Dufet gives numbers showing that his statement applies to a mixture of magnesium and zinc sulphates.

In *Compt. rend.* M. Demarcay describes two new compounds containing sulphur, nitrogen, and chlorine, viz., SNCl and $(SN)_3Cl$: the former prepared by passing chlorine into a solution of nitrogen sulphide in chloroform, and the latter by adding nitrogen sulphide to a solution, in chloroform, of the compound SNCl. SNCl is partly decomposed by heat, in accordance with the equation $2SNCl = N_2 + S_2Cl_2$.

THE relation between the tôtal energy developed in the chemical reactions which occur in various kinds of galvanic batteries and the energy which appears in the form of current electricity, has been recently studied by Thomsen (*Wiedemann's Annalen*) using a thermal method of measuring the total energy. He finds that the whole of the energy developed in the chemical change appears as electric energy in Daniell's battery (with closed circuit), and in those forms of batteries in which the metallic surface of the negative electrode is not changed by the electrolytic process; when nitric acid is used as electrolyte the same total conversion of one into another form of energy is

© 1880 Nature Publishing Group